



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,735	07/09/2008	Danny R. Milot	1-25152	2813
46582	7590	03/17/2009	EXAMINER	
MACMILLAN, SOBANSKI & TODD, LLC ONE MARITIME PLAZA - FIFTH FLOOR 720 WATER STREET TOLEDO, OH 43604				NOLAN, PETER D
ART UNIT		PAPER NUMBER		
3661				
			MAIL DATE	DELIVERY MODE
			03/17/2009	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/593,735	MILOT, DANNY R.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Peter D. Nolan	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 12 June 2008.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-15 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-15 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 21 September 2006 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>12/22/2006</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____ .

***Priority***

Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged.

***Information Disclosure Statement***

The information disclosure statement submitted 12/22/2006 has been received and placed of record in the file.

***Specification***

1. The disclosure is objected to because of the following informalities:
2. In paragraph 24, the equation for the lateral kinetic energy is incorrect because it is missing the mass of the vehicle.
3. In paragraphs 22-24, the center of gravity C.G. reference numbers are incorrect. They should be corrected to 32.
4. In paragraph 23, the z axis reference number is incorrect. It should be corrected to 26.

***Claim Rejections - 35 USC § 101***

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 1, 2, 3 are rejected under 35 U.S.C. 101 because they appear to be directed to a calculation itself rather than a practical application of the calculation in the real world. A Rollover Potentially Index and the Rollover Index are calculated, but there is no final step of using the calculated indexes in any way or making the indexes available for use in a meaningful way, such as providing a control signal from a

controller based on the indexes or outputting an indication based on the indexes. Thus the claim lacks a tangible result. Similarly, in claims 2 and 3 the measurements of the tire normal load and the tire contact patch length are not used to provide a tangible result.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, 5, 9, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watson (US 7057503 B2) in view of Yeh et al. (US 6542073 B2) and Clark (US 2005/0033549 A1).

**Regarding claim 1**, Watson teaches a method for detecting a potential for a vehicle rollover event (**see Watson abstract**), the method comprising the steps of: determining a lateral kinetic energy of the vehicle based on the vehicle longitudinal velocity and the vehicle side slip angle (**see Watson column 28, lines 25-59 where the lateral kinetic energy may be determined as  $1/2 * \text{mass}_{\text{veh}} * \text{Velocity}_{\text{lat}}^2$  and used to detect a potential rollover. It is well known in the art that the relationship between the side slip angle  $\beta$ , longitudinal velocity  $V_x$  and lateral velocity  $V_y$  is:  $\beta = -\arctan(V_y/V_x)$ . Therefore the lateral kinetic energy is inherently based on the vehicle longitudinal velocity and the vehicle side slip angle**); measuring a lateral

acceleration of the vehicle (**see Watson figure 3, Measures Algorithm 300.1; column 3, lines 8-18; column 4 lines 1-10**);

However, while Watson teaches determining a rollover potential based on the lateral kinetic energy and the lateral acceleration (**see Watson column 28, line 53 thru column 29, line 15**), it does not teach determining a rollover potentiality index based on the determined parameters. Furthermore, Watson does not teach measuring a tire load; determining a rollover index by weighing the rollover potentiality index by a factor of the lateral acceleration and a factor of the tire load and determining if the weighted index is above a predetermined threshold.

Yeh teaches determining a rollover index based on determined parameters (**see Yeh column 3, lines 27-40**) and determining if a rollover index is above a predetermined threshold (**see Yeh column 3, lines 27-54**).

It would be obvious to one skilled in the art to use the indexing function taught in Yeh to create a rollover potentiality index determined from the lateral kinetic energy and the lateral acceleration values determined in Watson because this enables the use of look-up table of predetermined threshold values responsive to the index values (**see Yeh column 3, lines 27-40**). It would further be obvious to determine if the resulting index is above a predetermined threshold, as further taught in Yeh, because this can signal that a rollover event may occur (**see Yeh column 8, lines 10-15**).

Yeh further teaches weighting a rollover index by a factor of the lateral acceleration (**see Yeh column 5, line 63 thru column 6, line 14 where the lateral acceleration may be used to provide a safing function. See also column 8, lines**

**1-33 where if the rollover value is above a threshold, the output of the safing function is used).**

Clark teaches a method for detecting a rollover potential for a vehicle that comprises, in part, measuring a tire load (**see Clark figure 5, loads  $F_L$ ,  $F_R$  and paragraphs 8, 29, 30**) and weighting a rollover potential by a factor of the tire load (**see Clark paragraph 22**).

It would be obvious to one skilled in the art to modify the rollover index taught in Watson, as modified with Yeh, with the lateral acceleration as further taught in Yeh because the lateral acceleration provides a safing function for the rollover detection method (**see Yeh column 5, line 63 thru column 6, line 14**). It would further be obvious to modify the rollover index by a factor of the tire load, as taught in Clark, because the tire load can provide a quick indication of an extreme change in vehicle orientation (**see Clark paragraph 24**).

**Regarding claim 2**, Watson, as modified by Yeh and Clark in claim 1, teaches where the measured tire load is a tire normal load (**see the rejection above regarding loads  $F_L$ ,  $F_R$** ).

**Regarding claim 5**, Watson, as modified by Yeh and Clark in claim 1, teaches where lateral acceleration of the vehicle is sensed using a lateral acceleration sensor (**see Watson column 3, lines 8-9 and column 5, lines 35-37**); the method further comprising sensing a yaw rate of the vehicle (**see Watson column 31, lines 9-15**), sensing a speed of the vehicle (**see Watson column 31, lines 9-15**), sensing a steering wheel angle of the vehicle (**see Watson column 31, lines 9-15**), and factoring the

speed of the vehicle and the steering wheel angle of the vehicle into the rollover index determination (**see Watson column 31, lines 9-15 regarding determination of lateral velocity from the speed of the vehicle and the steering wheel angle. See also column 30, lines 52-67**).

**Regarding claim 9**, Watson, as modified by Yeh and Clark in claim 1, teaches where the lateral acceleration of the vehicle is measured by an accelerometer attached to a center of gravity of the vehicle (**see Watson column 3, lines 8-12**).

**Regarding claim 15**, Watson, in view of Yeh and Clark, teaches an apparatus for detecting a rollover event for a vehicle comprising: (**Watson figure 16, rollover detection system 10 containing lateral accelerometer 18; column 3, lines 8-12; column 27, lines 57-60**; a yaw rate sensor for sensing a yaw rate of the vehicle (**see Watson column 31, lines 9-12**); a sensor for sensing a speed of the vehicle (**see Watson column 31, lines 9-15**); a steering wheel sensor for sensing a steering wheel angle of the vehicle (**see Watson column 31, lines 9-15**); a tire load sensing mechanism for measuring a tire load (**see Clark figure 5, loads  $F_L$ ,  $F_R$  and paragraphs 8, 29, 30**); and a controller configured to factor the speed of the vehicle and the steering wheel angle of the vehicle into the rollover index determination defined in claim 1 (**see the rejection of claim 1 above. See also the rejection of claim 5 above regarding factoring the speed of the vehicle and the steering wheel angle of the vehicle into the rollover index determination defined in claim 1**).

9. Claims 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watson (US 7057503 B2) in view of Yeh et al. (US 6542073 B2) and Clark (US 2005/0033549 A1) and further in view of Mancuso et al. (US 7404317 B2).

**Regarding claim 3**, Watson, as modified by Yeh and Clark in claim 1, does not teach where the measured tire load is determined by measuring a length of a contact patch of a vehicle tire and measuring changes to the contact patch length.

Mancuso teaches where a tire load may be determined by measuring a length of a contact patch of a vehicle tire and measuring changes to the contact patch length (**see Mancuso column 7, lines 33-39 and column 10, line 63 thru column 11, line 19 where an accelerometer may be used to estimate the length  $PL_c$  of a contact region between a tire and the road. See also column 11, lines 49-65 where the tire load  $F_z$  is derived from the length  $PL_c$** ).

It would be obvious to one skilled in the art to determine the tire load in Watson, as modified by Yeh and Clark in claim 1, using the method taught in Mancuso because this method minimizes the effect of the cornering angle and camber angle on the determined tire load (**see Mancuso column 11, lines 12-19**).

**Regarding claim 4**, Watson, as modified by Yeh and Clark in claim 1 and further modified by Mancuso in claim 3, teaches where the length of the contact patch is quantified by at least one of an accelerometer, a pressure sensing mechanism, and a temperature sensing mechanism (**see the rejection of claim 3 above**).

10. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watson (US 7057503 B2) in view of Yeh (US 6542073 B2) and Clark (US 2005/0033549 A1) and further in view of Applicant's admitted prior art.

**Regarding claim 6**, Watson, as modified by Yeh and Clark in claim 1, does not teach where the method further comprises the step of providing a control signal from a controller configured to output a control signal to a system of the vehicle to implement corrective action to reduce the potential of an actual rollover when the rollover index is above a predetermined threshold.

Applicant's admitted prior art teaches where rollover protection methods may include a step of providing a control signal from a controller to implement corrective action to reduce the potential of an actual rollover when a rollover potential is above a threshold (**see Applicant's specification page 1**).

It would be obvious to one skilled in the art to modify Watson, as modified by Clark and Yeh, with Applicant's admitted prior art because this can prevent a vehicle from rolling over rather than simply detect a rollover.

**Regarding claim 7**, Watson, as modified by Yeh and Clark in claim 1 and further modified by Applicant's admitted prior art in claim 6, teaches where the corrective action includes at least one of engine torque reduction, a steering wheel angle adjustment, and a suspension adjustment (**see Applicant's specification pages 1, 2**).

**Regarding claim 8**, Watson, as modified by Yeh and Clark in claim 1 and further modified by Applicant's admitted prior art in claim 6, teaches where the engine torque

reduction includes at least one of a change in engine output and actuation of vehicle brakes (**see Applicant's specification page 1 regarding differential braking**).

11. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watson (US 7057503 B2) in view of Yeh (US 6542073 B2), Clark (US 2005/0033549 A1) and Barta et al. (US 2003/0055549 A1).

**Regarding claim 10**, Watson teaches an apparatus for detecting a rollover event for a vehicle comprising: a lateral acceleration sensor for sensing a lateral acceleration of the vehicle (**see Watson figure 16, rollover detection system 10 containing lateral accelerometer 18; column 3, lines 8-12; column 27, lines 57-60**); a yaw rate sensor for sensing a yaw rate of the vehicle (**see Watson column 31, lines 9-12**); a sensor for sensing a speed of the vehicle (**see Watson column 31, lines 9-15**); a steering wheel sensor for sensing a steering wheel angle of the vehicle (**see Watson column 31, lines 9-15**).

However, while Watson teaches where a controller is configured to determine a rollover potential using at least one of the sensed lateral acceleration, yaw rate, vehicle speed, steering wheel angle, and tire load (**see Watson figure 16, processor 26; column 27, lines 30-41; column 28, line 25 thru column 29, line 15**), it does not teach where the apparatus further comprises a tire load sensing mechanism for measuring a tire load; where the controller is programmed with a dynamic vehicle model; and where the controller is configured to determine a rollover index from the sensed values and output a control signal to a system of the vehicle to implement a

corrective action to reduce the potential of an actual rollover when the rollover index is above the predetermined threshold.

Clark teaches where a rollover detection apparatus may include a tire load sensing mechanism for measuring a tire load (**see Clark figure 5, loads  $F_L$ ,  $F_R$  and paragraphs 8, 29, 30**).

It would be obvious to one skilled in the art to add the tire load sensing mechanism in Clark to the rollover detection apparatus in Watson because a change in tire pressure within a short period of time can be indicative of an extreme change in vehicle orientation (**see Clark paragraph 24**).

Yeh teaches where an apparatus for detecting a rollover event for a vehicle comprises a controller configured to determine a rollover index based on sensed values and further determine a rollover event when the rollover index is above a predetermined threshold (**see Yeh column 3, lines 27-41; column 7, line 24 thru column 8, line 17**).

It would be obvious to one skilled in the art to modify the apparatus taught in Watson to create a rollover potentiality index, as taught in Yeh, based on the sensed values in Watson because this enables the use of look-up table of predetermined threshold values responsive to the index values (**see Yeh column 3, lines 27-40**). It would further be obvious for the controller in Watson to be configured to determine if the resulting index is above a predetermined threshold, as further taught in Yeh, because this can signal that a rollover event may occur (**see Yeh column 8, lines 10-15**).

Barta teaches where an apparatus for detecting a rollover event for a vehicle comprises a controller programmed with a dynamic vehicle model (**see Barta**

**paragraphs 4, 5)** and where the controller is configured to output a control signal to a system of the vehicle to implement a corrective action to reduce the potential of an actual rollover when a rollover index is above a predetermined threshold (**see Barta paragraph 134**).

It would be obvious to one skilled in the art to modify the controller in Watson to contain a dynamic vehicle model as taught in Barta because it is well known in the art to use a dynamic vehicle model to compare actual sensor values to estimated values derived from a dynamic vehicle model to determine deviations in desired versus actual driving conditions.

It would further be obvious to modify the controller in Watson to implement a corrective action, as taught in Barta, because this can reduce the potential of a rollover.

**Regarding claim 11**, Watson, as modified by Clark, Yeh and Barta in claim 10, teaches where the corrective action includes at least one of engine torque reduction, a steering wheel angle adjustment, and a suspension adjustment (**see Barta paragraphs 134, 135**).

**Regarding claim 12**, Watson, as modified by Clark, Yeh and Barta in claim 10, teaches where the engine torque reduction includes at least one of a change in engine output and actuation of vehicle brakes (**see Barta paragraph 134**).

**Regarding claim 13**, Watson, as modified by Clark, Yeh and Barta in claim 10, teaches where the apparatus further comprises an accelerometer attached to a center of gravity of the vehicle for measuring the lateral acceleration of the vehicle (**see Watson column 3, lines 8-12**).

**Regarding claim 14**, Watson, as modified by Clark, Yeh and Barta in claim 10, teaches where the dynamic vehicle model includes a vehicle nominal height and a vehicle half track width (**see Barta paragraph 79**).

***Conclusion***

Any inquiry concerning this or any earlier communication from the examiner should be directed to Examiner Peter Nolan, whose telephone number is 571-270-7016. The examiner can normally be reached Monday-Friday from 7:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black, can be reached at 571-272-6956. The fax number for the organization to which this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Peter D Nolan/

Examiner, Art Unit 3661

3/11/2009

/Thomas G. Black/

Supervisory Patent Examiner, Art Unit 3661